

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS

Lih-Jyh Weng et al.
3123-554/MAX-017AUS

1/13

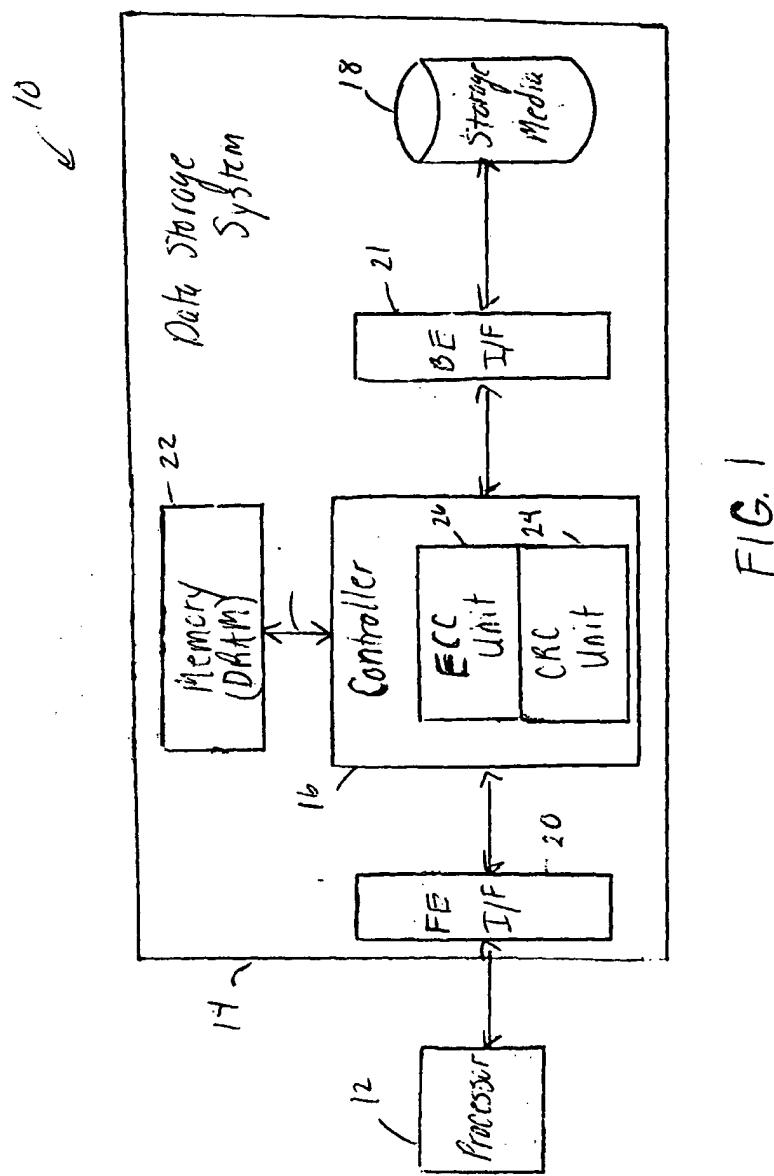


FIG. 1

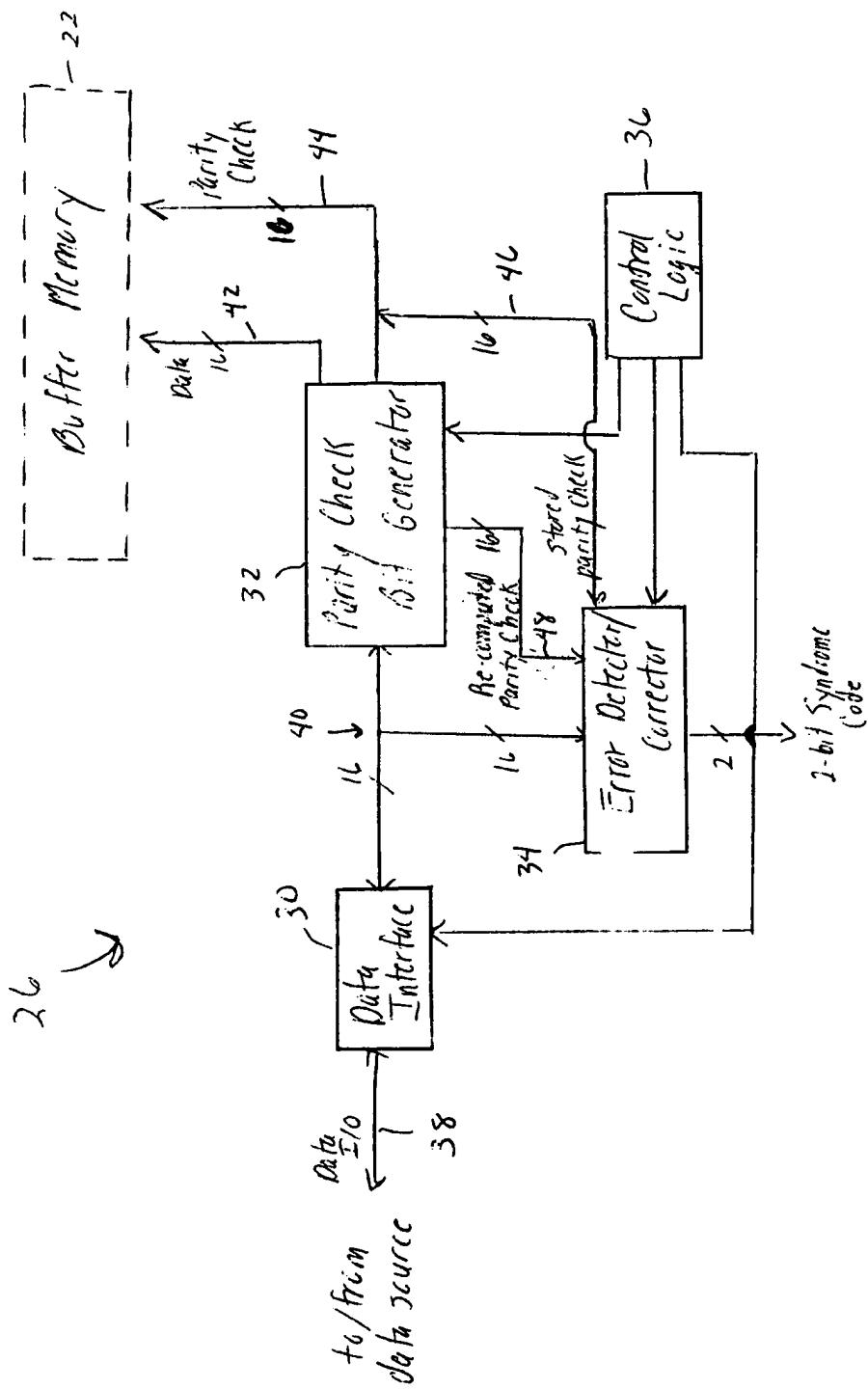


FIG. 2

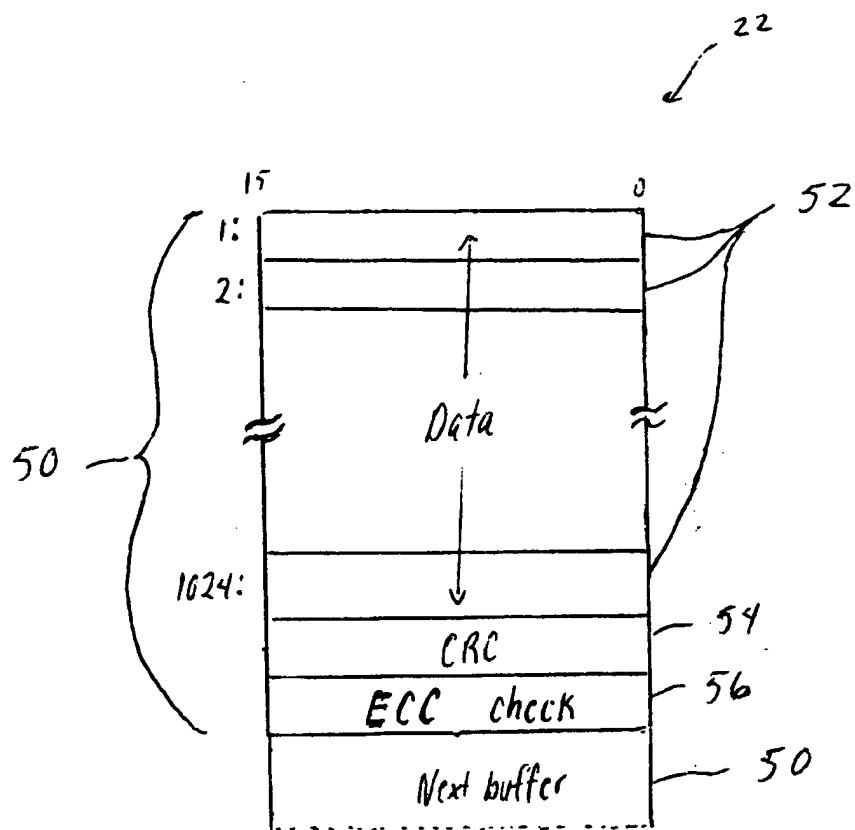


FIG. 3

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS
Lih-Jyh Weng et al.
3123-554/MAX-017AUS

4/13

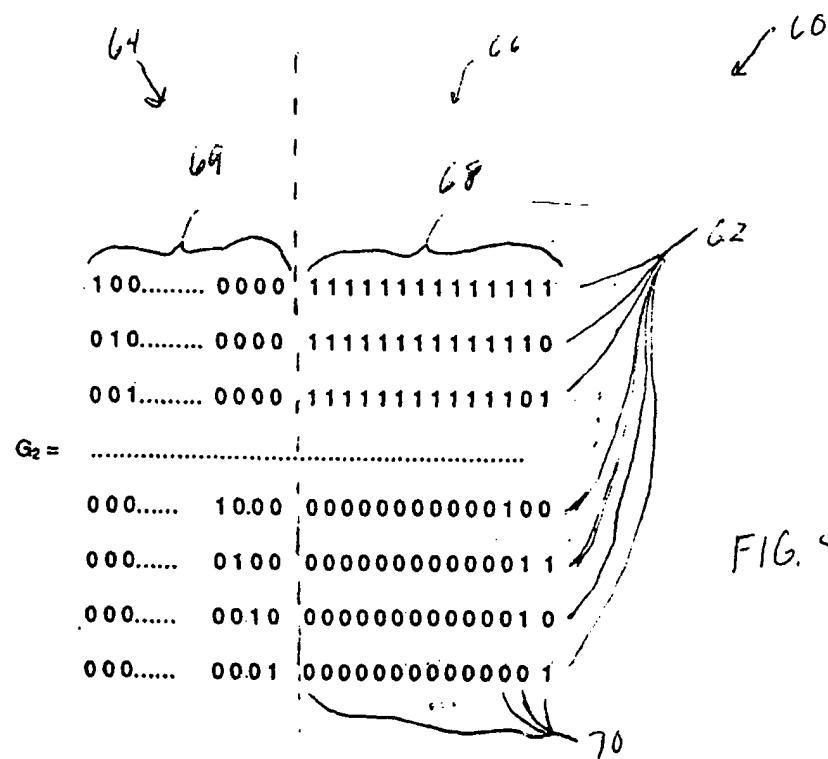


FIG. 4

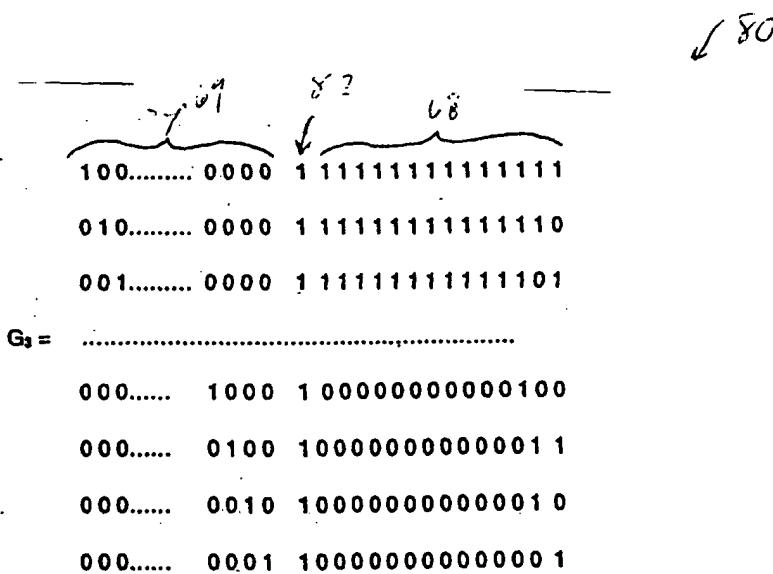


FIG. 5

5/13

69 68 84 ↘ 80'

100..... 0000 11111111111110

010..... 0000 111111111111101

001..... 0.00 11111111111011

$G_3' = \dots$

000..... 1000 000000000000101

000..... 0100 000000000000110

000..... 0010 000000000000101

000..... 00.01 000000000000011

FIG. 6

69 82 68 84 ↘ 96

100..... 0000 11111111111110

010..... 0000 111111111111101

001..... 0000 11111111111011

$G_4 = \dots$

000..... 1000 1000000000001001

000..... 0100 100000000000110

000..... 0010 100000000000101

000..... 00.01 100000000000011

FIG. 7

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS

Lih-Jyh Weng et al.
3123-554/MAX-017AUS

6/13

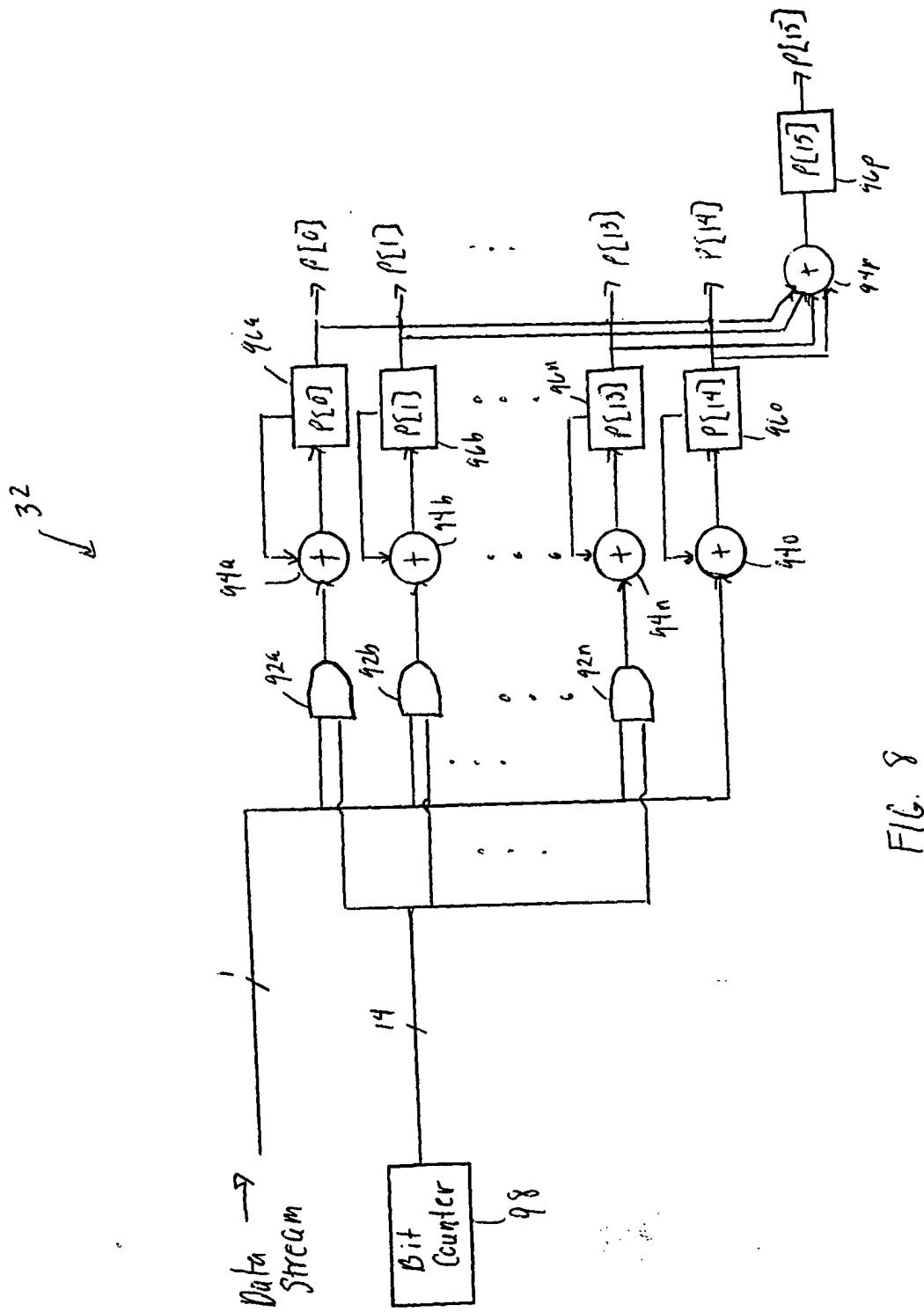
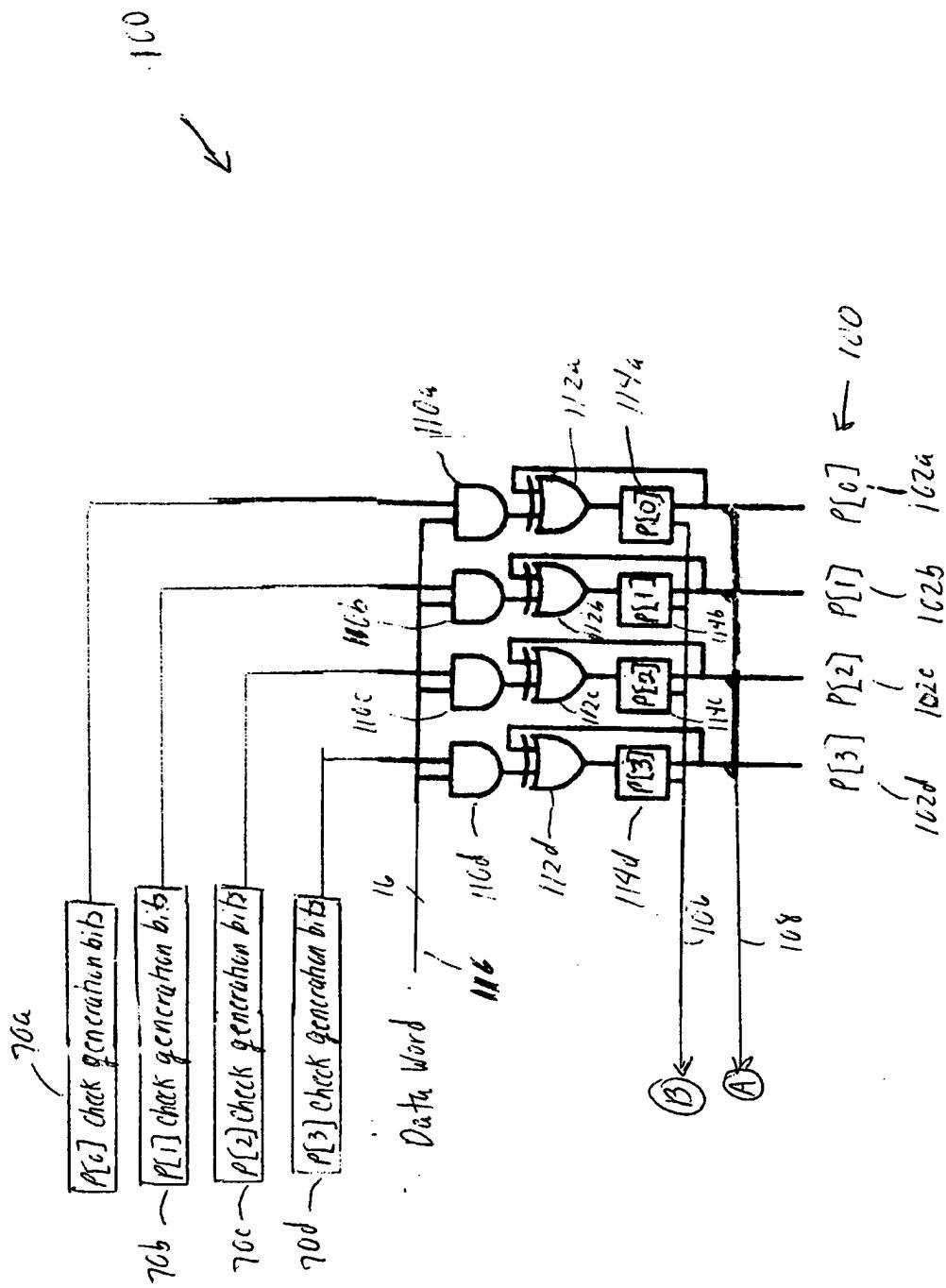


FIG. 8

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS

Lih-Jyh Weng et al.
3123-554/MAX-017AUS

7/13



F16. 9A

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS

Lih-Jyh Weng et al.
3123-554/MAX-017AUS

8/13

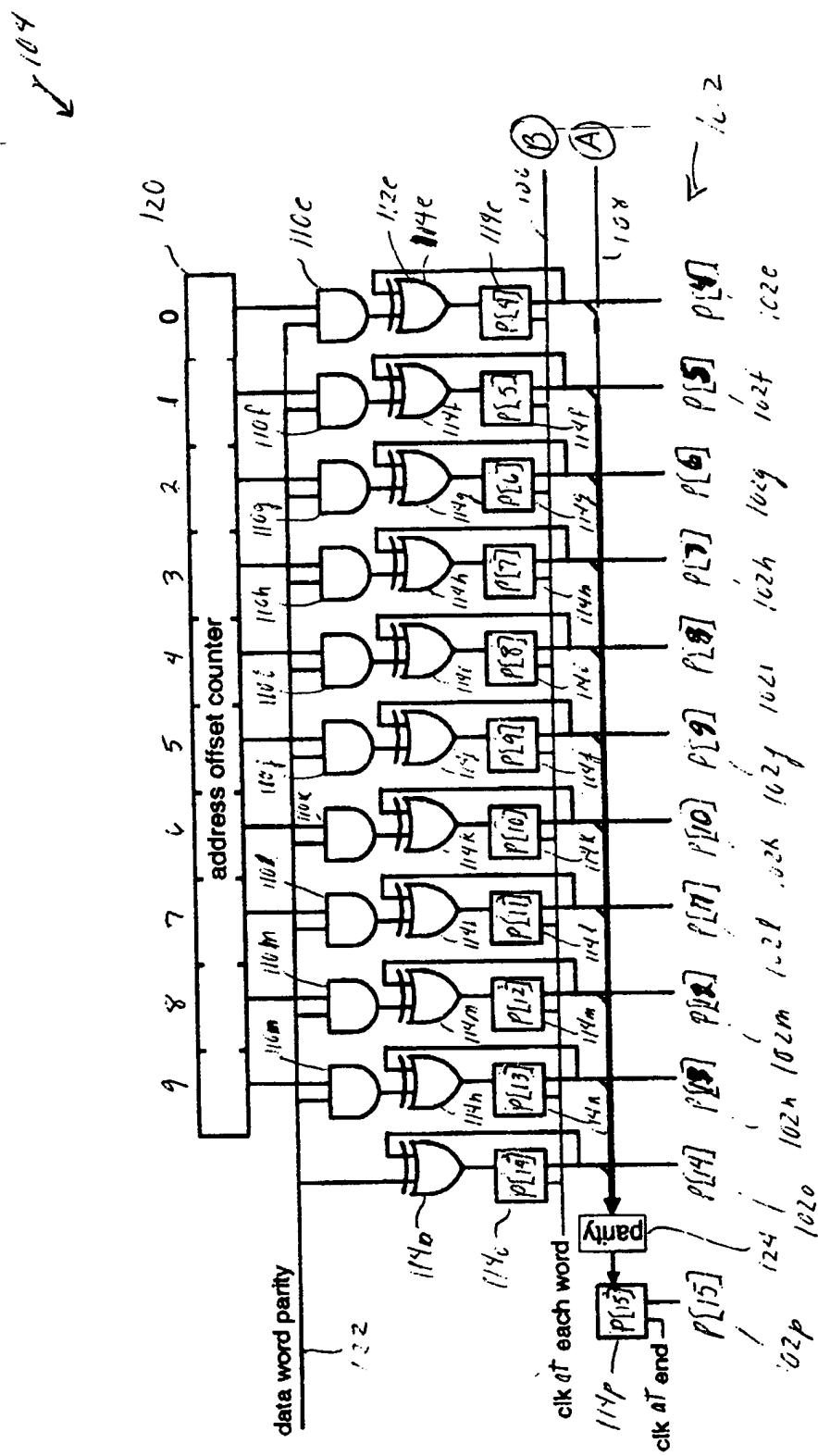


FIG. 9B

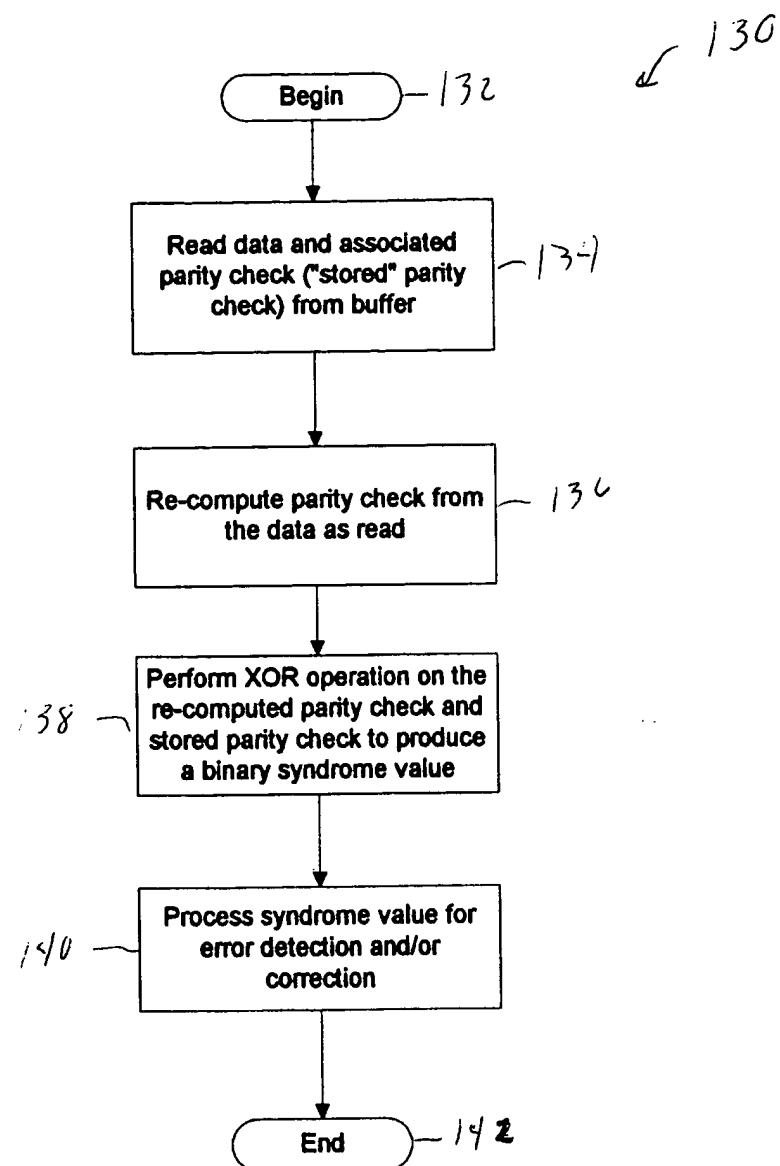


FIG. 10

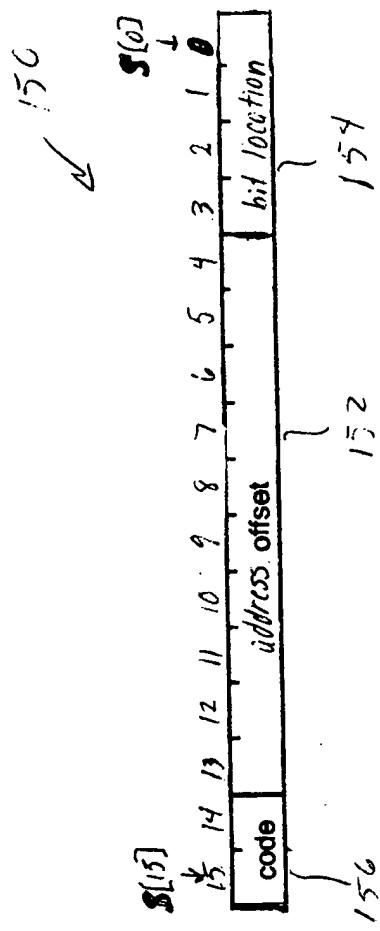


FIG. 11

11/13

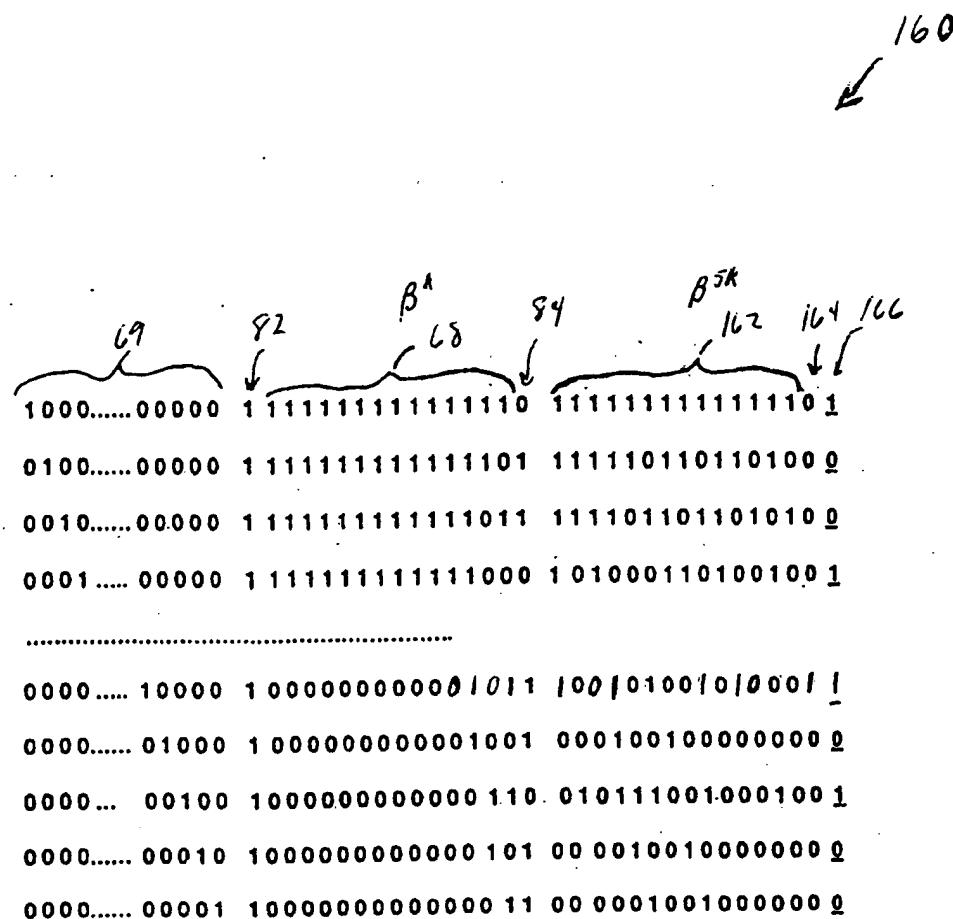


FIG. 12

SIMPLE ERROR-CORRECTION CODES FOR DATA BUFFERS
Lih-Jyh Weng et al.
3123-554/MAX-017AUS

12/13

170

```
unsigned encode()
{
    int M = 14;
    unsigned result;
    unsigned syndrome_x_0, syndrome_x_1, syndrome_x_5;
    int i, j;
    unsigned parity_on_parity;
    unsigned position; // The value of position starts at 1 and ends at 2^14 - 1.
    syndrome_x_0 = 0;
    syndrome_x_1 = 0;
    syndrome_x_5 = 0;
    for(i=0; i < CODE_LENGTH_IN_LONG_WORD; i++) {
        for(j = 0; j < 32; j++) {
            if(p_tmp[i] & (1<< j)) {
                syndrome_x_0 ^= 1; 172
                position = (unsigned) i*32 + j + 1;
                syndrome_x_1 ^= add_parity(position); 173
                syndrome_x_5 ^= add_parity(fifth_power(position)); 174
            }
        }
    }
    parity_on_parity = syndrome_x_0 ^ (syndrome_x_1 & 1) ^ (syndrome_x_5 & 1);
    result = 0;
    result ^= syndrome_x_5 << (30-M); // bits 16 - 30
    result ^= syndrome_x_1 << (24-M-M); // bits 1 - 15
    result ^= syndrome_x_0 << 1; // bit 31
    result ^= parity_on_parity; // bit 0
    return(result);
}
```

176

171

FIG. 13

180 ↘

69 92 β^k 68 84 β^{-k} 182 164 166

1000.....00000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1

0100.....00000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 0 1 0 0 0 0 1 0 1 0 1 1 1

0010.....00000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 0 0 1 0 0 0 0 1 0 1 0 1 0 1 1

0001.....00000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 0 1 1

$G_6^T = \dots$

0000.....10000 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 1 0 1 1 0

0000.....01000 1 0 0 0 0 0 0 0 0 0 0 1 0 0 1 1 0 0 0 1 1 0 0 0

0000... 00100 1 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 1 1 1 1 0 1

0000.....00010 1 0 0 0 0 0 0 0 0 0 0 1 0 1 1 0 1 0 0 1 0 1 0 0

0000.....00001 1 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 1 0 0 1 1 0 0 0 1 0 0 0

FIG. 14